Improving Surgical Outcomes in Patients Undergoing Breast Reconstruction using Tissue Expanders

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Background

Staged breast reconstruction using tissue expanders (TEs) is the most common form of post-mastectomy breast reconstruction. However, the method has one of the highest incidences of surgical site infections (SSIs) in plastic surgery (Craft, Damjanovic, & Colwell, 2012). SSIs can lead to breast reconstruction failure and serious and costly complications (Franchelli et al., 2012). Infection surveillance data collected at the Johns Hopkins Hospital (JHH) Breast Center in early 2013 showed a sudden increase in tissue expander infections, with superficial incisional SSIs spiking from 0 cases in the fourth-quarter of 2012 to 5 cases (7.1%) in the first-quarter of 2013, with national comparison data of 2% and 1.7%, respectively (ACS NSQIP, 2013). This prompted the formation of the JHH Breast Reconstruction Comprehensive Unit-based Safety Program (CUSP).

Objectives

A chart review of patients who underwent breast reconstruction using tissue expanders during 2013 was conducted in order to:

a) Determine the incidence of SSIs;
b) Identify microorganisms involved in SSI cases; and
c) Determine microorganism susceptibility to the standard JH Breast Reconstruction prophylactic antimicrobial regimen.

Methods

Charts of all patients that underwent a breast reconstructive procedure using TE at the JH Breast Center in 2013 were reviewed retrospectively. The patient’s history number was used to find the case in the Electronic Patient Record (EPR). All operative and clinical notes related to the reconstruction were reviewed to determine if the patient experienced a superficial, deep, or organ/space incisional SSI according to National Healthcare Safety Network (NHSN) definitions. In cases positive for SSI, laboratory results were reviewed to determine the results of a microbiology culture. The microorganisms were compared against the standard JH prophylactic antibiotic regimen to determine microbial susceptibility.

Results

There were 144 patients included in the chart review. Six cases (4.2%) experienced a deep incisional SSI within 30 days of the operative procedure; 16 cases (10.4%) experienced a deep incisional SSI within 90 days. Twenty cases (13.9%) experienced a deep incisional SSI more than 90 days after the operative procedure. Of the 20 cases classified as positive for deep incisional SSI, 17 cases had been proven via culture at the JHH laboratory. Over half (52.9%) of the cases involved a Staphylococcus species. Pseudomonas species were the next most commonly occurring microorganisms (found in 29.4% of cases), followed by Enterococcus, Escherichia and Serratia (each found in 11.8% of cases). The majority (60%) of cases that experienced deep incisional SSI required removal of the tissue expander without replacement or exchange, representing a failure of the breast reconstruction process.

Incidence of Deep Incisional SSIs, n=144

<table>
<thead>
<tr>
<th>Time After Surgery</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 30 days</td>
<td>6</td>
<td>4.2%</td>
</tr>
<tr>
<td>Within 90 days</td>
<td>15</td>
<td>10.4%</td>
</tr>
<tr>
<td>&gt;90 days</td>
<td>20</td>
<td>13.9%</td>
</tr>
</tbody>
</table>

Outcome of Infected Tissue Expanders

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal without replacement</td>
<td>12</td>
<td>60.0%</td>
</tr>
<tr>
<td>Replacement</td>
<td>3</td>
<td>15.0%</td>
</tr>
<tr>
<td>Exchange for permanent</td>
<td>1</td>
<td>5.0%</td>
</tr>
<tr>
<td>reconstruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TE left in place</td>
<td>4</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Conclusions

There was an alarmingly high incidence of deep incisional SSIs in 2013, ranging between 4.2% and 13.9%, with 60% of affected cases resulting in reconstruction failure. The most common infectious organisms were Staphylococcus species, which are susceptible to the current JH Breast Center prophylactic antimicrobial regimens and therefore represent a breakthrough infection (Viola, Raad & Rolston, 2014). However, more than one-quarter of the cases involved a Pseudomonas species, which are not susceptible to the prophylactic antimicrobial regimen used at JHH.

Future Directions

These findings will represent baseline data for the Breast Reconstruction CUSP team’s quality improvement activities, which are targeting various infection control measures. In addition, the CUSP team should consider adapting the prophylactic antimicrobial regimen to account for the types of microorganisms found in tissue expander cases complicated by infection.

References


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